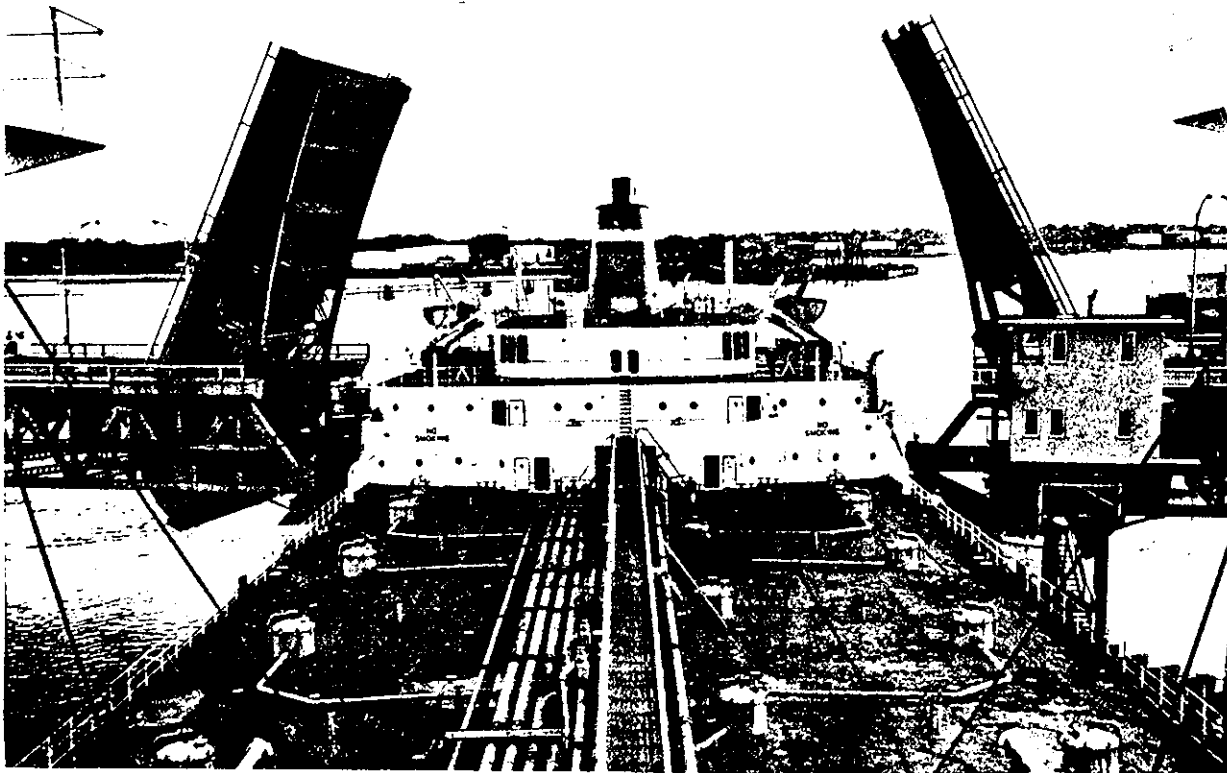


Navigation Improvement Study
Feasibility Report

Portland Harbor and Fore River Portland and South Portland, Maine



**US Army Corps
of Engineers**
New England Division

103
1987

PORTLAND HARBOR AND FORE RIVER
PORTLAND AND SOUTH PORTLAND, MAINE

NAVIGATION IMPROVEMENT STUDY
FEASIBILITY REPORT

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

MARCH 1987

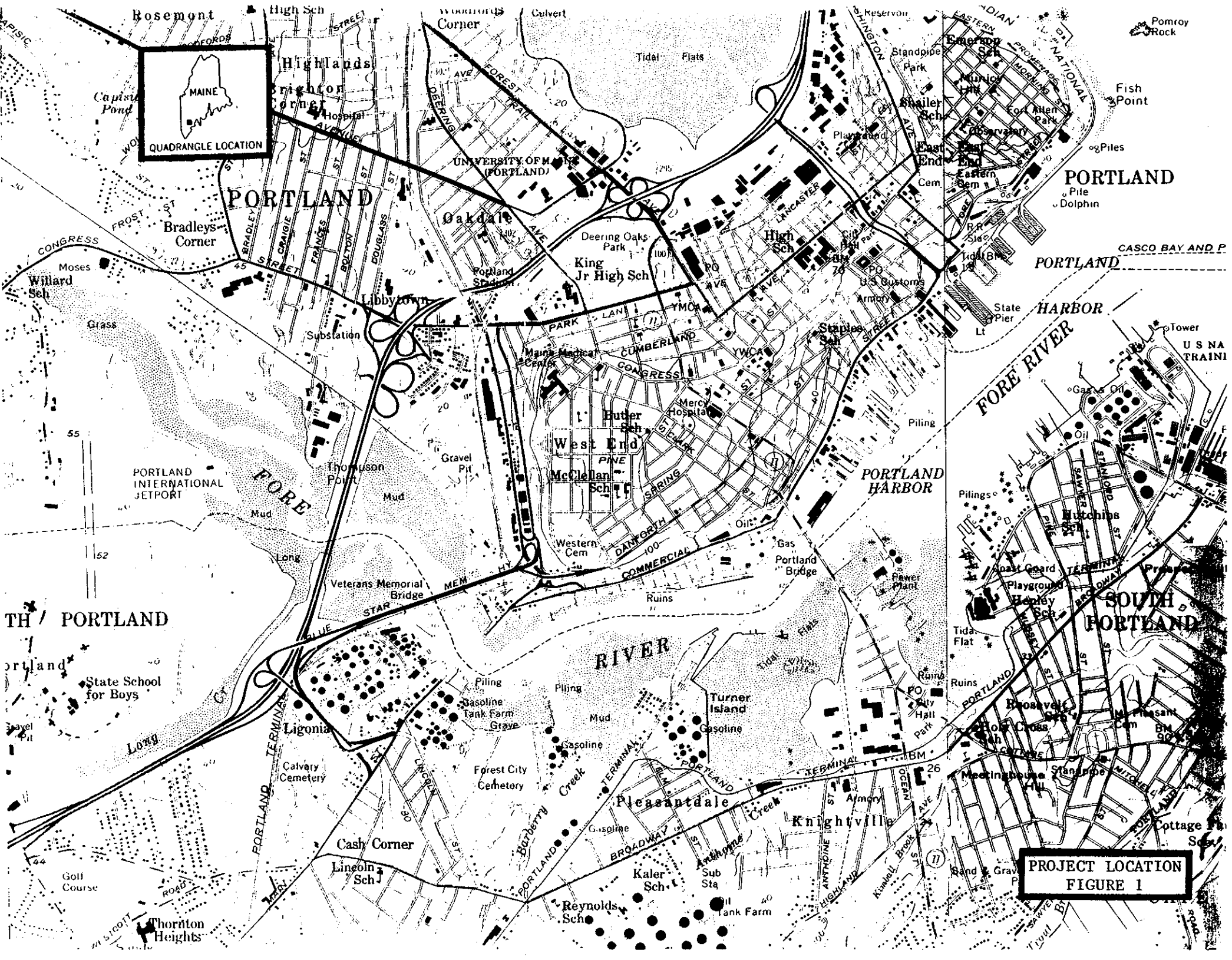
SYLLABUS

The cities of Portland and South Portland, Maine together with the oil terminal operators who conduct 96% of all commerce on the Fore River Channel, successfully petitioned the United States Congress to direct the U.S. Army Corps of Engineers to study possible navigation improvements to the Fore River Channel. The navigation problems in the Fore River are identified as a restriction in the navigation opening at the Portland Bridge, and limited depth in the Fore River Channel. It was intended that channel improvements would enable terminal operators to take advantage of the efficiencies of scale in purchasing and storing petroleum products by using larger vessels to transport these products. However, during the course of this study, two actions have taken place which impact the future of navigation improvements at this time, namely:

1. The Maine Department of Transportation has made progress towards planning and designing a replacement for the Portland Bridge that will provide greater vertical and horizontal clearances and;
2. Oil terminal operators have expressed a willingness and desire to continue operations on a smaller scale, that is using tug assisted barges. This shift in thinking is due to a decline in the oil market resulting from falling oil prices, a glut in supply, and higher interests rates than historically experienced.

Consequently, the findings of the study at this time indicate that it is not in the Federal interest to increase the dimensions of the existing Federally constructed and maintained channel in the Fore River. Further, the projected lack of economic justification, anticipated modification of the navigation opening at the Portland Bridge and waning support from channel users reinforce this finding. Upon reconstruction of the Portland Bridge, the channel dimensions through the navigational opening should be made consistent with the authorized Federal channel and this can be accomplished through the Corps' operation and maintenance program.

In response to Congressional study resolutions, this report recommends that no navigation improvements to the Portland Harbor/Fore River Channel by the U.S. Army Corps of Engineers be considered for Portland Harbor/Fore River, Maine at this time.



WATER RESOURCES IMPROVEMENT STUDY
PORTLAND HARBOR AND THE FORE RIVER
PORTLAND AND SOUTH PORTLAND, MAINE

NAVIGATION IMPROVEMENT FEASIBILITY REPORT

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INTRODUCTION

Study Authority:

The study of navigation improvements for Portland Harbor/Fore River, Maine has been conducted in compliance with resolutions adopted by the Committees on Public Works of the United States Senate and House of Representatives (dated 19 February 1968 and 10 July 1968, respectively).

RESOLVED BY THE COMMITTEE ON PUBLIC WORKS OF THE UNITED STATES SENATE, that the Board of Engineers for Rivers and Harbors is hereby requested to review the reports of the Chief of Engineers on Portland Harbor, Maine, published as House Document Number 216, Eighty-seventh Congress, and other pertinent reports, with a view to determining whether any modifications of the recommendations contained therein are advisable at the present time, with particular reference to providing greater project dimensions in the Fore River Channel, together with other appurtenant improvements in order to meet present and anticipated requirements of deep-draft navigation.

(The House of Representatives resolution contains virtually the same wording.)

The congressional resolutions were requested by local civic and business interests who desired to have the Portland Harbor waterways improved. The following study findings are in response to these resolutions.

Study Area:

Portland Harbor is located on the southwest end of Casco Bay along the southern Maine coast, approximately 45 miles northeast of the New Hampshire border and 100 miles northeast of Boston, Massachusetts. It is the second largest commercial harbor in New England and the largest in the State of Maine. The harbor is formed by a group of outlying islands and a mainland peninsula divided by the Fore River, which makes a natural barrier separating the cities of Portland and South Portland.

The focus of this study is on the Fore River Channel. The channel extends from a 45-foot deep entrance channel from Casco Bay to a 35-foot deep channel in the Fore River, passing through the Portland Bridge (Maine Route 77) and continuing upstream as far as the approach to the Veterans Bridge (U.S. Route 1A). (See Figure on last page.) The Portland Bridge spans across the Fore River Channel and has a navigation opening consisting of two bascule leaves that are raised to create a maximum horizontal clearance of 98 feet. This 98-foot clearance limits the size of vessels that can navigate the upper portion of the Fore River Channel, and has been a major constraint to navigation on the upper portion of the channel.

Historically, Portland has been the major port on the U.S. seaboard north of Boston for commercial shipping, fishing, railway, shipbuilding and related activities. Portland Harbor is also the receiving port for petroleum products for the areas of southern Maine, the adjacent areas of New Hampshire and the Province of Quebec, Canada. A pipeline system carries crude oil from Portland Harbor to refineries in Montreal, and a smaller line transports petroleum products from Portland Harbor to Bangor. All of the refined petroleum terminals and tank farms in the Portland area are located along the Fore River Channel in South Portland.

Existing Federal Project:

The existing Federal project was adopted by the 1936 River and Harbor Act and was completed in June 1968. The existing Federal project, as shown in the Figure 2, includes:

1. An entrance channel 1,000 feet wide and 45 feet deep, extending about 9,000 feet from deep water in Casco Bay opposite South Portland to a line about 2,000 feet seaward of the entrance to the Fore River, to service the deepwater oil-receiving terminals at South Portland;
2. A maneuvering basin and anchorage area 45 feet deep, northwest of House Island and northeast of the head of the entrance channel;
3. A channel 35 feet deep of varying widths, extending about 9,500 feet into the Fore River to Portland Bridge (Route 77), to service the Portland and South Portland main waterfronts;
4. A channel 35 feet deep and 400 feet wide in the Fore River, extending about 6,800 feet from Portland Bridge to the site of the former Vaughan Bridge, then 300 feet wide for an additional 500 feet to about 700 feet downstream of Veterans Memorial Bridge (Route U.S. 1), with a turning basin of the same depth at the south side of the channel, about 1,000 feet downstream from the channel head;
5. An anchorage 30 feet deep off Fish Point, the eastern end of the city of Portland;
6. An approach channel 30 feet deep and 300 feet wide, extending about 2,500 feet from northern end of the 30-foot anchorage to the Canadian National Railroad (Grand Trunk) Bridge at the entrance to Back Cove (about 1.5 miles north of the Fore River), then 14 feet deep in the 1,700-foot reach between the Grand Trunk and Tukey (Interstate 495) Bridges; and then 12 feet deep and 300 feet wide for a distance of 2,500 feet along the east side of Back Cove;
7. A stone breakwater extending about 2,000 feet northeastward from the south side of the inner harbor (behind which fill was placed to form the eastern end of the South Portland waterfront);

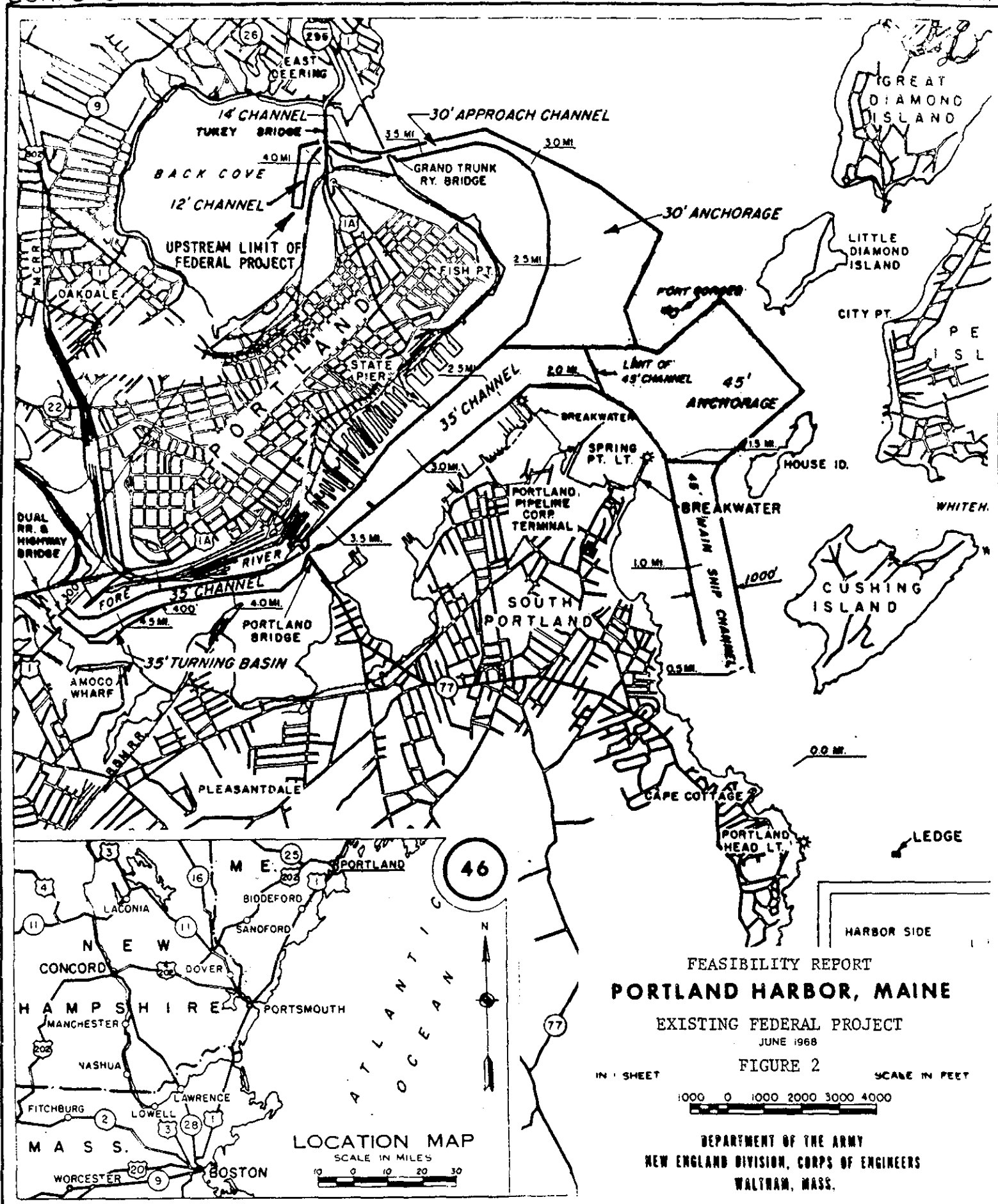
8. A stone breakwater extending about 900 feet northeastward from Spring Point, South Portland, to Spring Ledge Lighthouse; and
9. Maintenance to a depth of 40 feet of Soldier Ledge Channel in Hussey Sound, a passage between Peaks and Long Islands, which are part of a group of small, habitated islands near the center of Casco Bay.

Prior Studies:

Federal Studies: As part of the current study, an information pamphlet was released in 1977 identifying and analyzing proposed improvement alternatives for solving the navigation problems in the Fore River Channel. The pamphlet was issued when work on the study was suspended in FY 1977, at the request of local interests, due to the uncertainty of constructing a new high-level highway bridge across the Fore River. A report recommending no Federal improvements was in preparation at that time. Local interests have since indicated plans to construct a new bridge and requested in FY 1984 that the study be completed.

The 1977 information pamphlet presented eight alternatives for meeting the future navigation needs in the Fore River and Portland Harbor. The alternatives included various combinations of modifying or replacing the existing Portland Bridge and deepening the Fore River Channel, and constructing a common petroleum receiving terminal and pipeline distribution system for oil companies. The study results indicated that all the plans analyzed were engineeringly feasible, but only the oil terminal and pipeline facility plan was economically justified. The facility included a common terminal located north of the Portland Pipeline Pier #2, and an intermediate storage and pipeline distribution system to link the terminal with existing oil facilities. This alternative was rejected because under existing authority the Corps of Engineers cannot construct or financially participate in such a facility. The study did site that the planning and construction of a common terminal and distribution system could be accomplished by non-Federal interests.

Non-Federal Studies: A feasibility study on improvements to the Portland Bridge at Portland and South Portland, Maine was conducted by a private consultant contracted by the Maine Department of Transportation. The study resulted in a report, Feasibility Study, Fore River Crossing, Portland - South Portland, released in September 1983. The intent of this study was to determine the feasibility of constructing a replacement structure for the Portland Bridge versus repairing the existing structure, and to identify the probable impacts on the social, economic and physical environment. A series of bridge replacement and rehabilitation alternatives were analyzed to determine the most viable options. The study results indicated that the cost of improving the condition at the Portland Bridge required a \$58 to \$83 million capital investment, depending on the alternative selected. In the analysis, the consultants identified and quantified benefits associated with bridge reconstruction, including benefits to waterborne transportation. These benefits made up



approximately three-fourths of the total benefits accrued from completing improvements to the bridge and widening the navigation opening from 98 to 200 feet. The benefits are primarily based on cost savings in shipping due to efficiencies of scale obtained from an increase in the use of larger vessels in the Fore River Channel.

PROBLEM IDENTIFICATION

The primary navigation problem in the Fore River Channel is the restrictive navigation opening at the Portland Bridge. The existing 98-foot horizontal clearance limits passage to smaller tankers (35,000 dead weight tons or less) and tug assisted barges. This results in delays and damages to vessels as they proceed through the bridge, and also results in losses to upstream users since they cannot take advantage of the efficiencies of scale associated with the use of larger tankers and barges.

A secondary navigation concern in the Fore River are the operational losses incurred when vessels with drafts greater than 35 feet must wait for favorable tides to transit the river to service upstream users.

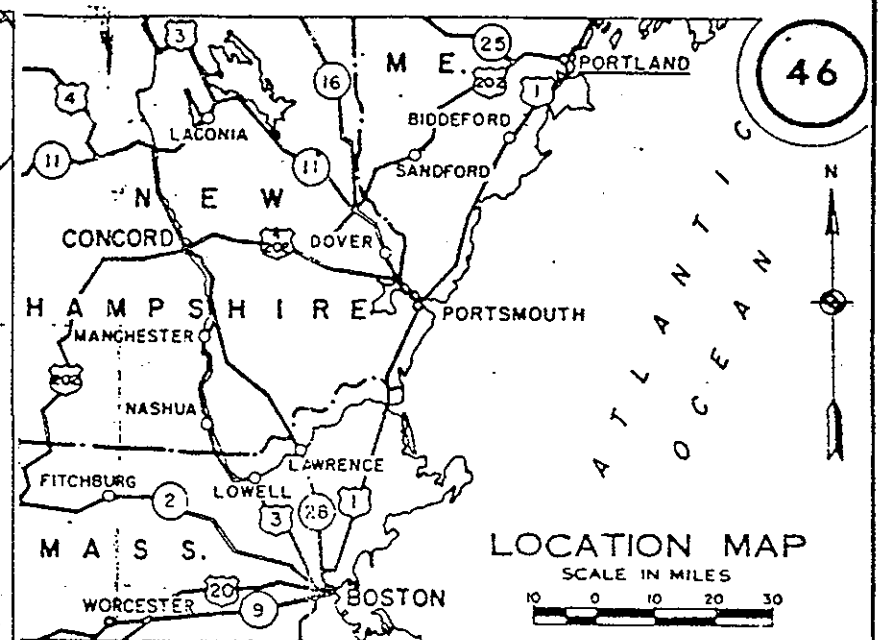
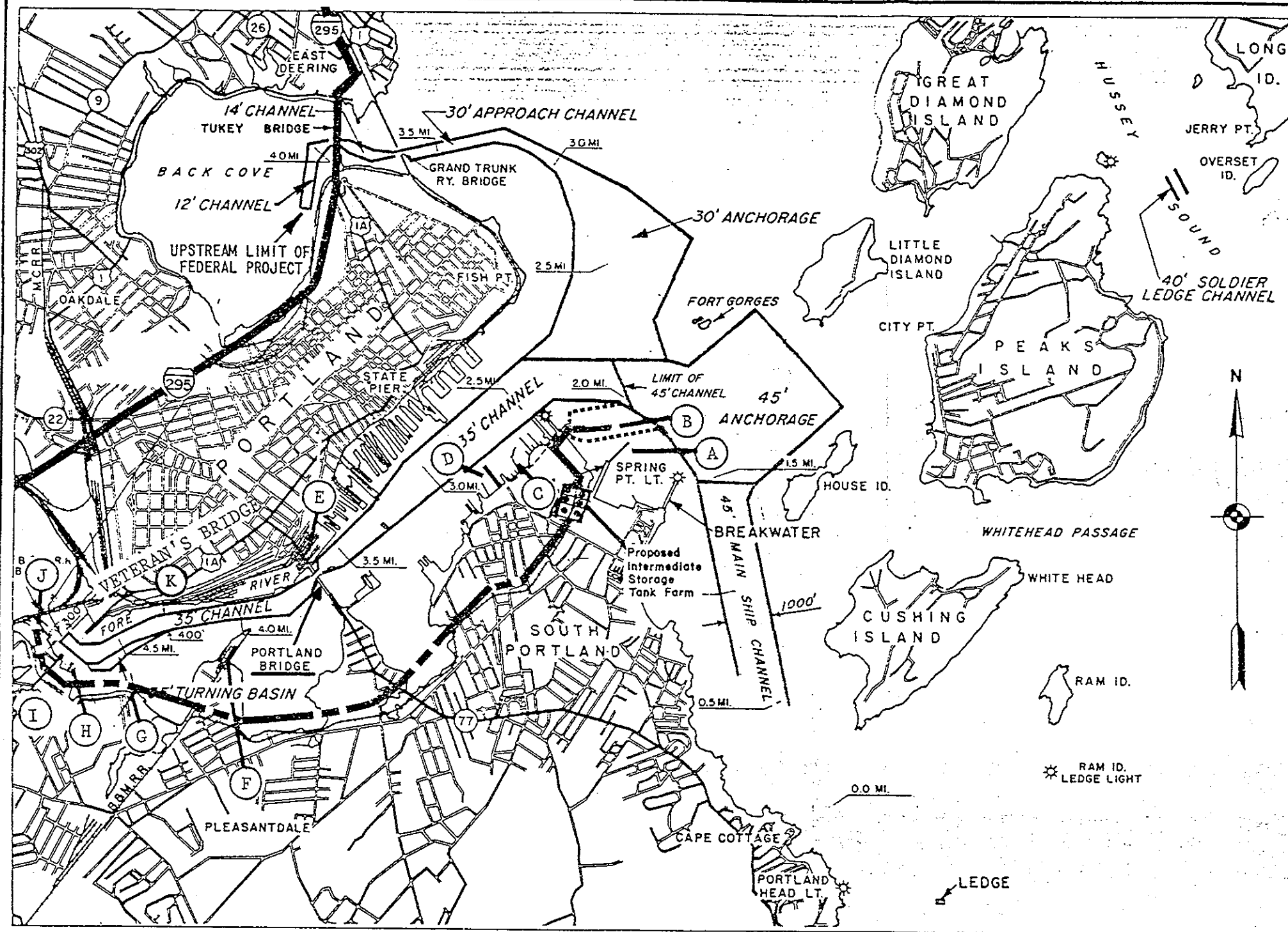
PLAN FORMULATION

Terminal and Transfer Facilities:

There are 54 piers, wharves and docks located in the Portland Harbor/Fore River Channel area. Twenty-three of the 54, including all the oil facilities, are located in South Portland; twenty on the south side of the Fore River Channel and three on Casco Bay just south of the river mouth; (see Figure at end of report). The oil terminal facilities handle 96% of the total traffic on the Fore River Channel, and the primary use of Portland Harbor is for receiving and transshipping petroleum products. The petroleum companies operating out of Portland/South Portland are: British Petroleum, Chevron, Exxon, Global, Gulf, Koch, Mobil, Northeastern Petroleum, Portland Pipe Line Corporation (PPLC) and Texaco. The Portland Pipe Line Company facility is particularly important to Portland Harbor since it handles all the crude oil traffic in the port through its facility at Pier #2. Pier #1 is a reserve facility and has not been operated for several years. The crude is transported by PPLC via a pipeline owned jointly with the Montreal Pipe Line Company to refineries in Montreal.

Historical Commodity Movements:

In New England, Portland Harbor is second only to the Port of Boston in the movement of commodity traffic. As previously noted, more than 96% of this commodity traffic is in the shipment of petroleum and petroleum products, the remainder is in general cargo and dry bulk shipments. Distribution of petroleum is made by vessels, barges, railroad tank cars, trucks and pipeline.



BRIDGE CLEARANCES

PORTLAND HARBOR (BASCULE)
HOR. 100 FT.
VERT. 31 FT. M.H.W.

TUKEY BRIDGE
HOR. 100 FT.
VERT. 30 FT. M.H.W.

DUAL R.R. & HY. FIXED BRIDGE
HOR. 99 FT.
VERT. 10 FT. M.H.W.

Location

- A Portland Pipeline Pier #2
- B Possible Common Terminal (2 Berths)
- C Chevron Oil Co. Dock
- D Portland Pipeline Pier #1
- E Portland Bridge Horiz. Opening 98 ft.
- F Texaco Oil Co. Wharf

Location

- G Amoco Oil Co. Wharf
- H Mobil Oil Co. Dock also serves Northeast Pet. Co. & Gibbs/BP Oil
- I Northeast Petroleum Wharf
- J Bancroft and Martin Docks also serves Exxon, Getty, Gulf, Shell, and Gibbs/BP Oil Companies
- K Merrill's Marine Terminal

FIGURE 3
**WATER RESOURCES
IMPROVEMENT STUDY
FORE RIVER
PORTLAND HARBOR, MAINE**
EXISTING FEDERAL PROJECT AND
TERMINAL FACILITIES

IN 1 SHEET
SCALE IN FEET
1000 0 1000 2000 3000 4000

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.

Total traffic through Portland Harbor grew from 15,509,000 short tons (ST) in 1961 to a peak of 31,679,000 ST in 1971 and then declined to 7,904,000 ST in 1983. These changes in total commodity movements are associated primarily with crude oil, all of which is imported from foreign countries and transshipped by pipeline to refineries in Montreal. Imports of crude declined by approximately 85% from 1971 to 1983, and based on recent information from PPLC, the decline has continued through 1985. The quantities of other petroleum products such as gasoline, residual and distillate fuel, kerosene and jet fuel have also declined. There was an 11% decline of petroleum product shipments in 1977 and a 43% decline in 1983. These percentages are also computed based on 1971 traffic levels. In general, the declines reflect a softening in demand for petroleum and petroleum products and a consequent reduction in inventories.

Tanker traffic into the Portland Pipeline Corporation facilities has dropped dramatically from 446 vessels in 1974 to 57 vessels in 1983. The capacity of the average vessel has, however, increased from 64,300 DWT and a 36.7-foot draft to 89,000 DWT and a 37.4-foot draft. PPLC will not benefit from deepening the Fore River Channel given its location outside of the channel, its ability to service tankers with a 45 foot draft and the fact that it is presently operating at only 15% of its 1974 capacity.

Traffic in general cargo, such as pulp, paper, other forest products and fish, and bulk cargo, such as coal, urea and salt, are shipped through facilities in Portland Harbor in limited quantities. Dry bulk and general cargo traffic in the Fore River Channel is serviced primarily by Merrill's Marine Terminal. Total traffic in 1984 was approximately 200,000 short tons. There is an effort being made by state, local and private interests to actively promote movement of general cargo, break-bulk, bulk and container cargo traffic through the port.

Current Vessel Fleet and Future Trends:

The current fleet operating in The Portland Harbor/Fore River Channel includes both self propelled and nonself propelled vessels (barges), the majority of which are tankers to service the transportation of petroleum and petroleum products. In fact, virtually all the deep draft vessels entering Portland Harbor carry petroleum and petroleum related products. This again is due to the fact that 96% of the commerce conducted in the Portland Harbor/Fore River is related to the oil terminal facilities located in South Portland.

The composition of the fleet servicing Portland Harbor/Fore River has changed over the past 10 to 15 years. The transportation of crude oil is accomplished with fewer deep draft tankers and more barges. The number of tankers with a draft of more than 19 feet has declined by 68% from 771 vessels in 1970 to 247 in 1983, while the use of nonself propelled vessels has increased from 7% of the petroleum traffic in 1970 to 46% in 1983. The level of non-crude carrying tanker traffic has experienced similar

trends. The 1982 level of traffic is 50% of the 1974 level, with the use of barges increasing from 15% to 41% of the total non-crude traffic. Also of note is the decline in the number of tankers having drafts of more than 34 feet. Although these large tankers have to move into the harbor on the high tides, their numbers are few and insignificant. Traffic at the Texaco terminal, upstream of the Portland Bridge, is indicative of trends since 1981, the most recent year for which official commercial statistics are available for Portland Harbor. Interviews at Texaco reveal that traffic has declined dramatically in the past several years due to the conversion from oil to other energy sources by Texaco's customers. Notably, paper mills have converted from oil to wood byproducts to supply their energy needs. Traffic declined from 12 tankers and 123 barges in 1981 to 2 tankers and 40 barges in 1983. Current information reveals that a higher proportion of tanker traffic may reflect lower overseas refining costs. This phenomenon is considered to be a temporary one at the present time.

Discussions with other oil terminal operators, confirm the trend towards more barges and integrated tug and barge units in lieu of tankers for the future transportation of petroleum products other than crude into Portland Harbor. The advantages in cost (capital outlay and recurrent costs), lower labor requirements and faster turnaround time more than balance the inconveniences of lower operating speeds, less reliability in inclement weather and less maneuverability. The barges currently in use in Portland Harbor, of which the maximum is about 22,000 DWT, are fully capable of navigating the present 35-foot channel. Additionally, oil terminal operators foresee a declining, or at best a slow growing, market for their products. During the present oil glut and current price decreases, those operators who are able to buy on the spot markets in the Boston and New York-New Jersey areas prefer to keep inventories low. Under these circumstances, the oil companies favor barges for the transport of their petroleum product.

Twenty-eight vessels comprised of 20 ships and 8 barges serviced general and dry bulk cargo in the Fore River Channel in 1984. Several of the ships carrying scrap and urea had drafts in excess of 35 feet.

Analysis and Projection of Trends:

The decline in petroleum and petroleum product traffic is primarily attributable to a decrease in demand for crude oil in Canada, which is shipped via the PPLC facility, and for gasoline, other distillates, and residual products in the areas served by Portland Harbor; i.e. Maine, and southeastern New Hampshire. As stated earlier, PPLC is the sole receiving terminal for crude oil in Portland Harbor. Virtually all crude oil is transported through its Pier #2 to the connecting Canadian carrier, the Montreal Pipe Line Company, which in turn pumps it to refineries in Montreal. Pier #2, with a berthing depth of 48 feet below MLW, is located at the 45-foot anchorage south of the entrance to the Fore River Channel. This is outside the study area. The reserve pier, Pier #1, with

a berthing depth of 34 feet is also located outside of the Fore River Channel. The dramatic decline in the quantity of crude shipped to Canada, and the consequent excess capacity at Piers #1 and #2, along with the fact that PPLC services vessels with drafts to 45 feet outside of the Fore River Channel, means that there is no basis for considering the transport of crude oil through Portland Harbor as a benefit which would result from deepening the Fore River Channel.

The decline in demand for oil and oil products in the area serviced by Portland Harbor and the consequent decrease in oil shipments to Portland are expected to lead to the consolidation of oil terminals through mergers and acquisitions, the shifting of some of the remaining terminals to more attractive sites, and a change in land use for the abandoned facilities to recreational, residential and other commercial use.

If the channel were deepened and market conditions were favorable, Merrill Marine Terminal states that it is highly probable that they would modify their operation to accommodate deeper draft vessels, resulting in a projected fivefold increase in business from 200,000 ST in 1984 to 1,000,000 ST in 1994. The average savings as a result of channel deepening for dry bulk and general cargo would be approximately \$0.81 per ton. This would result in total transport savings of approximately \$401,000 annually. These savings are insufficient to justify deepening of the Fore River Channel.

ANALYSIS OF PLANS

The economic justification of proposed Federal navigation improvements is determined by comparing the average annual benefits accruing to the project over its economic lifespan to the equivalent average annual costs. The benefits must equal or exceed the costs in order for the Federal Government to participate in the project.

Benefits and costs are compared by putting them on an average annual basis using the interest and amortization rate of 8-5/8% currently applicable to Federal Projects. The economic or amortized life of the project is 50 years.

Costs of Alternatives:

The first costs of construction are estimated for six channel deepening alternatives. Two channel widths of 400 and 500 feet are considered with three depths of 38 feet, 41 feet and 45 feet. All the alternatives follow the same alignment as the existing channel. In addition, costs are estimated for constructing a maneuvering basin that would provide access to shipping activities along the Portland side of the Fore River Channel

in the area of the State Pier. Dredging quantities range from approximately 1,000,000 cubic yards to 5,000,000 cubic yards, depending upon the alternative considered. First costs include contingencies, engineering and design, and supervision and administration. The first costs of construction for the various channel deepening alternatives are summarized below.

FORE RIVER/PORTLAND HARBOR, MAINE - NAVIGATION IMPROVEMENT STUDY
FIRST COST AND CONSTRUCTION TIME FOR CHANNEL DEEPENING ALTERNATIVES
(1986 Price Level, in \$1,000's)

| | 400-Foot Channel | | | 500-Foot Channel | | |
|-------------------------|------------------|--------|--------|------------------|--------|--------|
| Channel depth (feet) | 38 | 41 | 45 | 38 | 41 | 45 |
| Construction Time (mo.) | 9 | 16 | 26 | 14 | 23 | 33 |
| First Costs | 6,400 | 10,700 | 15,900 | 9,600 | 14,400 | 20,900 |
| Annual Costs | 600* | 950 | 1,410 | 850 | 1,280 | 1,850 |
| Annual Benefits ** | 401 | 401 | 401 | 401 | 401 | 401 |
| Benefit/Cost Ratio | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |

| | 400-Foot Channel & Maneuvering Area | | | 500-Foot Channel & Maneuvering Area | | |
|-------------------------|--|--------|--------|--|--------|--------|
| Channel Depth (feet) | 38 | 41 | 45 | 38 | 41 | 45 |
| Construction Time (mo.) | 10 | 20 | 33 | 16 | 26 | 39 |
| First Costs | 7,200 | 12,900 | 20,800 | 10,800 | 16,900 | 25,100 |
| Annual Costs | 640 | 1,150 | 1,840 | 960 | 1,500 | 2,220 |
| Annual Benefits | 401 | 401 | 401 | 401 | 401 | 401 |
| Benefit/Cost Ratio | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |

* Includes costs of deepening the berth for Merrill's Marine Terminal, interest during construction and annual maintenance costs.

** Annual benefits were calculated for the 38-foot depth only and assumed a fivefold increase in dry-bulk and general cargo.

Evaluated Benefits:

The major potential economic benefits that would accrue from deepening the existing channel are those due to the use of larger vessels for the transportation of refined petroleum products, which comprise more than 96% of all traffic in the Fore River. These benefits would be realized by obtaining efficiencies of scale and reducing transportation costs. Similarly, more efficient use of existing vessels would occur due to reductions in tidal delays and the necessity for multiport operations. Improved safety at the harbor, though not directly quantifiable, would also be a significant benefit. The risk of collisions and/or groundings is partially dependent on the density of traffic. Deepening the channel would enable larger vessels to make fewer total trips, reducing traffic and improving safety.

The use of larger vessels to deliver petroleum products to oil facilities in the Fore River Channel is precluded by the fact that existing data and information, and the declarations of oil terminal users, indicate a slow growth market for petroleum products in the Portland area and a trend toward the use of more and larger shallow draft barges for the transportation of these products. Barges transiting the Fore River Channel now constitute approximately 50% of all vessels with drafts in excess of 18 feet. These vessels would not require a deepened channel. Further, independent petroleum marketers have been increasingly replacing larger producer/refiner companies in the Portland area. These independent marketers lease space and/or have throughput agreements with the oil terminal operators. With respect to the purchase of petroleum, they may operate on contracted agreements as well as on the spot market in the Boston and New York-New Jersey areas. Given the current glut in the petroleum market, they prefer to keep inventories low, buy on the nearby spot markets, and transport their product by barge. The only aspect that would indicate an increase in the use of tankers would be lower overseas refining costs. This, however, is considered a short term situation.

For certain terminals, the deepening of the Fore River Channel would lessen transportation costs due to reduced tidal delays and multiport operations. It has been determined that these benefits are relatively insignificant and would not of themselves justify navigation improvements. The same is true for benefits that would accrue from savings to vessel operators due to a reduction in damages by collisions and groundings.

Project Use - With and Without Improvements:

Improvement or replacement of the Portland Bridge is presently being planned by the State of Maine. If the size of the navigation opening is increased as a result of bridge modifications, then the U.S. Army Corps of Engineers can dredge the authorized channel through the new bridge opening to appropriate dimensions. This work can be accomplished through the Corps operation and maintenance programs.

Whether or not the Fore River Channel is deepened, growth is expected to be moderate and will not exceed historic traffic levels until nearly the twenty-first century. Projections of future traffic in the Fore River Channel consist of petroleum products other than crude oil. In 1982, Fore River Channel traffic comprised 4,021,000 ST of refined petroleum products and 324,000 ST of general cargo. Refined petroleum traffic is projected to return to its 1971 level in the year 2000 and reach 10,000,000 ST in the year 2035. These study projections exceed those of the Maine Office of Energy Resources and are considered to represent a high rate of growth. General cargo traffic of 324,000 ST in 1982 is relatively insignificant at present. The Maine Department of Transportation and Merrill's Marine Terminal are actively pursuing studies and marketing strategies to create a container feeder service and to attract bulk and break-bulk traffic between Portland Harbor and other American and Canadian ports. However,

there is no basis at present for projecting large volumes of dry cargo traffic, nor would installation of a container feeder facility require deepening the channel.

Interviews with the oil terminal and general cargo users of the Fore River Channel reveal that virtually none would take advantage of the deepening of the Fore River Channel by co-investing in their piers and berthing facilities in order to take advantage of the economics of scale for transporting their products on larger vessels. The decline in demand for oil and oil products in the area serviced by Portland Harbor, and the consequent decrease in oil shipments through Portland could lead to a consolidation of oil terminals through mergers and acquisitions, but this scenario cannot be justified at this time. The trend in petroleum traffic is clearly towards more and larger barges which do not require channel deepening, and a decline in the number of tankers.

Merrill's Marine Terminal services virtually all of the dry bulk and general cargo traffic in the Fore River Channel. If the channel were deepened, and market conditions were favorable, Merrill states that it is highly probable that he would modify his berth and access channel in order to accommodate deeper draft vessels. Under such conditions, dry bulk and general cargo tonnage could increase to 1,000,000 ST in ten years.

ENVIRONMENTAL CONSIDERATIONS

Environmental considerations of the proposed construction of a deeper navigation channel in the Fore River are made with reference to the June 1979 Environmental Impact Statement completed for the report on the Fore River Channel maintenance dredging. Based on that report, it is determined that dredging the 1,000,000 to 5,000,000 cubic yards of material to complete the proposed project will have a limited, short-term impact on the natural resources of the area. The major impacts to the resources would result from activities associated with the actual construction of the project. Benthic organisms inhabiting the project site will be removed and destroyed by the dredging. Turbidity from construction activities can bury and suffocate other non-motile species and effect the availability of light to phytoplankton and oxygen to other organisms. These effects, however, will cease with the completion of the project. More mobile species such as fish, crabs, and lobster can avoid the area of disturbance, and adult and larval recruitment of benthic species from the surrounding area are expected to recolonize the disturbed area after completion of the project.

DISCUSSION

As previously noted, the major source of economic benefits that would accrue from deepening the Fore River Channel are those realized from the use of larger vessels to transport refined petroleum products, which constitute 96% of the commerce in the Fore River. It has been determined that only moderate increases in refined petroleum traffic are predicted in

the next 50 years. The trend at this time is for greater use of larger shallow draft barges for the transport of refined products. These vessels do not require channel deepening. Also, with the exception of Merrill's Marine Terminal, present and potential users would not modify their operations nor co-invest in improving their piers and berthing facilities so as to take advantage of the economies of scale realized from using larger vessels. Therefore, there is insufficient user support for deepening the Fore River Channel. Transport savings at Merrill's Marine Terminal alone would not be sufficient to justify deepening the Fore River Channel.

The future of traffic in commodities other than refined petroleum products has also been determined insufficient to justify deepening the Fore River Channel. As stated, the Maine Department of Transportation and Merrill's Marine Terminal are attempting to attract bulk and break-bulk traffic between Portland Harbor and other American and Canadian ports, and are actively studying the possibility of installing a container feeder service to meet the demand of this potential market. It has been determined that large increases in general and dry cargo traffic are not anticipated. Also, the installation of a container feeder facility would not in itself require deepening the Fore River Channel. The only other commodity considered viable for transport and handling in Portland Harbor and the Fore River Channel is crude oil. Crude petroleum traffic does not currently use the Fore River Channel, and it is anticipated that if a market in this commodity develops, it will be transported by the Portland Pipeline Corporation's Pier #2 located outside the Fore River Channel.

Regarding benefits accrued from reductions in vessel operating costs due to tidal delays and damages due to collisions and groundings, it has been determined that such benefits are insufficient to justify deepening the Fore River Channel. There is an insignificant number of vessels operating in the Fore River Channel with drafts large enough that are experiencing tidal delays, and there is an insignificant amount of damage to vessels operating in the area.

CONCLUSIONS

Although the engineering and environmental analyses conducted for this report indicate that there is a feasible plan to provide navigation improvements by deepening the Fore River Channel, the economic analysis indicates that such navigation improvements are not justified. This is based on the lack of economic benefits generated by the proposed improvements, and the lack of local support from those who use the Fore River Channel.

It is determined, that replacement of the Portland Bridge by the Maine Department of Transportation with one having a greater navigation opening, together with widening the channel to meet the new opening, will meet present and projected navigation needs.

RECOMMENDATION

The results of this investigation conclude and recommend that no navigation improvements by the U.S. Army Corps of Engineers be considered for Portland Harbor/Fore River, Maine at this time.

Should replacement of the Portland Bridge incorporate a wider navigation opening, channel dimensions consistent with the limits of the new navigation opening can be considered and accomplished through the Corps' normal operation and maintenance program.

APPENDIX 1

ENVIRONMENTAL SETTING

Portland Harbor and Fore River, Portland and South Portland, Maine

1. Environmental Setting

The following data was obtained from information in the Portland Harbor Final Environmental Impact statement. No samples were taken at the project site by the staff of NED.

Fore River is a productive estuary supporting both salt marshes and tidal flats. Approximately 132 acres of wetlands cover the upper section (above Route I-295) of the river. The salt marsh cordgrass (Spartina alterniflora) is the dominant and most important member of this plant community that is flooded daily. In areas only inundated by higher than normal tides, Spartina patens, the salt-meadow grass is the dominant species. Other common species found in this community include black grass (Juncus gerardi), saltmarsh sedge (Carex paleacea), and glasswort (Salicornia europea).

Marine worms account for 70% of the organisms found in the upper Fore River. Arthropods comprised the second largest group of organisms collected. Molluscs, such as the common mud snail (Nassarius obsoleta) were found as well as a few soft-shell clams (Mya arenaria) and blue mussels (Mytilus edulis).

The main feature of the lower portion (below Route I-295) of Fore River is the extensive area of tidal mudflats. Several species of marine (polychaete) worms contributed nearly 69% of the total number of organisms found. Round worm species (Cerebratulus sp., Micura sp., Rhyncoid sp.) contributed 25% of the fauna samples. Bivalves (including Mya arenaria, Mytilus edulis, etc.) and gastropods formed the next largest phyla. Lobster is commercially harvested in Portland Harbor. About four or five fishermen set pots in the harbor and annually harvest approximately 2500 pounds.

Fish reported in relatively large numbers in Fore River are winter flounder (Pseudopleuronectes americanus), alewives (Alosa pseudoharengus, and rainbow smelt (Osmerus mordax). Other frequent species of fish are the common mummichog (Fundulus heteroclitus), striped mummichog (Fundulus majalis), threespine stickleback (Gasterosteus aculeatus), and fourspine stickleback (Apeltes quadracus).

The following anadromous fish utilize Fore River for at least part of their life cycle: alewives, rainbow smelt, striped bass (Morone saxatilis), and brook trout (Salvelinus fontinalis).

Waterfowl (Aythya marila, Bucephala albeola and Clangula clangula) frequent Fore River during late fall and early winter, and feed on the blue mussels found in the river. Black ducks (Anas rubripes) and mallards (Anas platyrhynchos) are present year around. Some other species present are the great blue heron (Ardea herodias), belted kingfisher (Ceryle alcyon), double-crested cormorant (Phalacrocorax auritus) and the ubiquitous seagull (Larus spp.).

The Fore River is classified by the Maine Department of Environmental Protection as "SB". "SB" waters are the second highest classification and are considered unimpaired habitat. Normal tidal range is nine to 10 feet.

II. Environmental Considerations

Dredging between 1,000,000 and 5,000,000 cubic yards of substrate from the project area will impact the environment in several ways. Benthic organisms inhabiting the project site will be removed and destroyed by dredging. Turbidity from these construction activities can bury or suffocate other non-motile species. The suspended materials can also effect light availability to phytoplankton and oxygen availability to other organisms if organic content is high. However, these effects are short-term and will cease with the completion of the project. More mobile species such as fish, crabs, and lobsters can avoid the area of disturbance. Adult and larval recruitment of benthic species from the surrounding area will recolonize the disturbed area. The benthic community may return to its pre-dredge level within a short time.

APPENDIX 2

DRAFT REPORT CORRESPONDENCE

DAEN-CWP-E (NEDPL-C/24 Nov 86) 1st End
SUBJECT: Portland Fore River, Portland and South Portland,
Maine - CWIS 39004

HQ, U.S. Army Corps of Engineers, Washington, D.C. 20314-1000

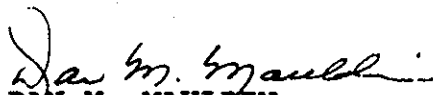
TO: Commander, New England Division, ATTN: NEDPL-C 02 FEB 1987

1. As requested, we have reviewed the subject report and offer the following comment.

2. To fulfill the requirements of feasibility and support the statement made on page 11 under conclusions, a brief discussion summarizing the environmental analysis conducted must be included in the final report.

FOR THE COMMANDER:

wd all Encl


DAN M. MAULEIN
Chief, Planning Division
Directorate of Civil Works



DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254-9149

REPLY TO
ATTENTION OF

November 28, 1986

Planning Division
Coastal Development Branch

TO WHOM IT MAY CONCERN:

Enclosed for your review and comment, is a draft copy of the Feasibility Report for navigation improvements in the Fore River at Portland and South Portland, Maine.

This office, after investigating various alternatives, has determined that construction of an improved navigation channel in the Fore River is not justified. This decision is based on the current and projected economic needs of those using the Fore River Channel, lack of interest by local terminal operators, and anticipated modifications to the Portland Bridge. It should be noted, however, that upon reconstruction of the Portland Bridge, the U.S. Army Corps of Engineers can modify the existing Federal channel to accommodate the increased navigation opening. This can be accomplished through the Corps operation and maintenance program.

Any comments should be forwarded to:

Division Engineer
New England Division
U.S. Army Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02254-9149

It is requested that all comments reach this office no later than January 31, 1987. Should you require additional information, please contact the Project Manager Mr. Raymond Korber at (617) 647-8553.

Sincerely,

Thomas A. Rhen
Colonel, Corps of Engineers
Division Engineer

Enclosure



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254-9149

November 28, 1986

ANNOUNCEMENT OF RELEASE
OF DRAFT FEASIBILITY REPORT
PORTLAND HARBOR AND FORE RIVER
PORTLAND/SOUTH PORTLAND, MAINE

The New England Division, Corps of Engineers, has just completed a study to determine the engineering feasibility, economic justification, and environmental acceptability of providing navigation improvements to the Fore River at Portland and South Portland, Maine. The study of improvements was conducted under Congressional resolutions.

The study included the following work: analyses of present and prospective commercial use of the Fore River Channel and the existing commercial facilities that depend on the channel; detailed cost-benefit analyses; an investigation of all alternative navigation improvements; and detailed analyses of the impact of the proposed improvements. The study has resulted in the completion of a Feasibility Report.

The findings of the study conclude that there is no current Federal interest in providing navigation improvements to the existing Federally constructed and maintained Fore River Channel. This conclusion is based on the lack of economic justification, lack of support from channel users, and anticipated modifications to the Portland Bridge. It should be noted, however, that upon reconstruction of the Portland Bridge, the U.S. Army Corps of Engineers can modify the existing Federal channel to accommodate the increased navigation opening. This can be accomplished through the Corps' operation and maintenance program.

If you have any questions or wish to obtain a copy of the Feasibility Report, please contact the project manager, Mr. Raymond Korber of the Coastal Development Branch, at:

Department of the Army
Corps of Engineers
New England Division
424 Trapelo Road
Waltham, Massachusetts 02254-9149
Telephone: 617-647-8553

Sincerely,

A handwritten signature in dark ink, appearing to read "Thomas A. Rhen", is written over the typed name.

Thomas A. Rhen
Colonel, Corps of Engineers
Division Engineer



DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254-9149

REPLY TO
ATTENTION OF

November 28, 1986

Planning Division
Coastal Development Branch.

Honorable Ronald Dorler
Mayor of Portland
Portland, Maine 04101

Dear Mayor Dorler:

The New England Division has completed its study of the proposed navigation improvements to the Fore River Channel at Portland and South Portland, Maine. Study of improvements to the Fore River was directed by Congressional resolutions. A draft copy of the Feasibility Report is attached for your review and comment.

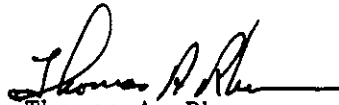
Based on the results of our study, it has been determined that there is no current Federal interest in providing navigation improvements to the existing Federally constructed and maintained Fore River Channel. This conclusion is based on the lack of economic justification, lack of support from channel users, and anticipated modifications to the Portland Bridge. The lack of economic justification stems from the fact that only moderate growth in commercial traffic in the Fore River Channel is expected in the near future. This includes dry bulk, general cargo and petroleum traffic. In conjunction with this, oil terminal operators have expressed an unwillingness to expand their facilities to take advantage of the economies of scale that would be realized in using larger vessels that could access the terminal facilities with a deeper channel. As a result, interest by local terminal operators in the project has declined. It has also been determined that providing a larger navigation opening through the Portland Bridge together with widening the channel will meet present and projected navigation needs. The number of vessels with drafts greater than the current channel depth of 35 feet is insignificant and could not justify deepening the channel. Also, the trend in the petroleum traffic, which comprises 96 percent of the commerce in the channel, shows a decline in the use of larger tankers and an increase in the use of larger barges that do not require deep draft channels.

Therefore, it is recommended that no Federal navigation improvements by the U.S. Army Corps of Engineers be undertaken at this time. It should be noted, however, that upon reconstruction of the Portland Bridge, the Corps of Engineers can modify the channel to accommodate the increased navigation opening. This can be accomplished through the Corps' operation and maintenance program.

I would like to add at this time, that to finalize the report in an expeditious manner, it would be appreciated if any comments you may have reach me no later than January 31, 1987. Any comments will be included in our final report to the Board of Engineers for Rivers and Harbors.

If you have any questions, please feel free to contact me at (617) 647-8220, or the Project Manager Mr. Raymond Korber, at (617) 647-8553.

Sincerely,

A handwritten signature in dark ink, appearing to read "Thomas A. Rhen", with a long horizontal flourish extending to the right.

Thomas A. Rhen
Colonel, Corps of Engineers
Division Engineer

Attachment

Same letter sent to:

Honorable Santo DiPietro
Mayor of South Portland
South Portland, Maine 04106



DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254-9149

REPLY TO
ATTENTION OF

November 28, 1986

Planning Division
Coastal Development Branch.

Honorable Santo DiPietro
Mayor of South Portland
South Portland, Maine 04106

Dear Mayor DiPietro:

The New England Division has completed its study of the proposed navigation improvements to the Fore River Channel at Portland and South Portland, Maine. Study of improvements to the Fore River was directed by Congressional resolutions. A draft copy of the Feasibility Report is attached for your review and comment.

Based on the results of our study, it has been determined that there is no current Federal interest in providing navigation improvements to the existing Federally constructed and maintained Fore River Channel. This conclusion is based on the lack of economic justification, lack of support from channel users, and anticipated modifications to the Portland Bridge. The lack of economic justification stems from the fact that only moderate growth in commercial traffic in the Fore River Channel is expected in the near future. This includes dry bulk, general cargo and petroleum traffic. In conjunction with this, oil terminal operators have expressed an unwillingness to expand their facilities to take advantage of the economies of scale that would be realized in using larger vessels that could access the terminal facilities with a deeper channel. As a result, interest by local terminal operators in the project has declined. It has also been determined that providing a larger navigation opening through the Portland Bridge together with widening the channel will meet present and projected navigation needs. The number of vessels with drafts greater than the current channel depth of 35 feet is insignificant and could not justify deepening the channel. Also, the trend in the petroleum traffic, which comprises 96 percent of the commerce in the channel, shows a decline in the use of larger tankers and an increase in the use of larger barges that do not require deep draft channels.


Therefore, it is recommended that no Federal navigation improvements by the U.S. Army Corps of Engineers be undertaken at this time. It should be noted, however, that upon reconstruction of the Portland Bridge, the Corps of Engineers can modify the channel to accommodate the increased navigation opening. This can be accomplished through the Corps' operation and maintenance program.

I would like to add at this time, that to finalize the report in an expeditious manner, it would be appreciated if any comments you may have reach me no later than January 31, 1987. Any comments will be included in our final report to the Board of Engineers for Rivers and Harbors.

-2-

If you have any questions, please feel free to contact me at (617) 647-8220, or the Project Manager Mr. Raymond Korber, at (617) 647-8553.

Sincerely,

A handwritten signature in dark ink, appearing to read "Thomas A. Rhen". The signature is fluid and cursive, with a long horizontal stroke at the end.

Thomas A. Rhen
Colonel, Corps of Engineers
Division Engineer

Attachment

Same letter sent to:
Honorable Ronald Dorler
Mayor of Portland
Portland, Maine 04101



DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254-9149

REPLY TO
ATTENTION OF

NEDPL-C

24 November 1986

SUBJECT: Portland Fore River
Portland and South Portland, Maine
CWIS 39004

Commander
U.S. Army Corps of Engineers
ATTN: DAEN-CWP-E
20 Mass. Ave., N.W.
Washington, D.C. 20314-2000

1. The New England Division has completed a draft Feasibility Report for Portland Harbor and the Fore River, Portland and South Portland, Maine. As this project is not economically justified, the report recommends no federal action be taken at this time.
2. In accordance with ER 1105-2-10 dated 18 December 1985 and ER 1105-2-60 dated 22 November 1985, enclosed for your technical review and comment are 10 copies of the draft report.
3. The affected communities, the Cities of Portland and South Portland are being informed of our action (copy of letter attached).

THOMAS A. RHEN
Colonel, Corps of Engineers
Commanding

Attachment



DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254-9149

REPLY TO
ATTENTION OF

November 24, 1986

Planning Division
Coastal Development Branch

Honorable Joseph E. Brennan
Governor of the State of Maine
State House
Augusta, Maine 04330

Dear Governor Brennan:

The New England Division has completed its study of the proposed navigation improvements to the Fore River Channel at Portland and South Portland, Maine. Study of improvements to the Fore River was directed by Congressional resolutions. A draft copy of the Feasibility Report is attached for review and comment by the State.

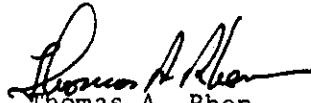
Based on the results of our study, it has been determined that there is no current Federal interest in providing navigation improvements to the existing Federally constructed and maintained Fore River Channel. This conclusion is based on the lack of economic justification, lack of support from channel users, and anticipated modifications to the Portland Bridge. The lack of economic justification stems from the fact that only moderate growth in commercial traffic in the Fore River Channel is expected in the near future. This includes dry bulk, general cargo and petroleum traffic. In conjunction with this, oil terminal operators have expressed an unwillingness to expand their facilities to take advantage of the economies of scale that would be realized in using larger vessels that could access the terminal facilities with a deeper channel. As a result, interest by local terminal operators in the project has declined. It has also been determined that providing a larger navigation opening through the Portland Bridge together with widening the channel will meet present and projected navigation needs. The number of vessels with drafts greater than the current channel depth of 35 feet is insignificant and could not justify deepening the channel. Also, the trend in the petroleum traffic, which comprises 96 percent of the commerce in the channel, shows a decline in the use of larger tankers and an increase in the use of larger barges that do not require deep draft channels.

Therefore, it is recommended that no Federal navigation improvements by the U.S. Army Corps of Engineers be undertaken at this time. It should be noted, however, that upon reconstruction of the Portland Bridge, the Corps of Engineers can modify the channel to accommodate the increased navigation opening. This can be accomplished through the Corps' operation and maintenance program.

I would like to add at this time, that to finalize the report in an expeditious manner, it would be appreciated if any comments the state may have reach me no later than January 31, 1987. Any comments will be included in our final report to the Board of Engineers for Rivers and Harbors.

If you have any questions, please feel free to contact me at (617) 647-8220, or the Project Manager Mr. Raymond Korber, at (617) 647-8553.

Sincerely,

A handwritten signature in dark ink, appearing to read "Thomas A. Rhen", with a stylized flourish at the end.

Thomas A. Rhen
Colonel, Corps of Engineers
Division Engineer



DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254-9149

November 24, 1986

REPLY TO
ATTENTION OF

Planning Division
Coastal Development Branch

Honorable William S. Cohen
United States Senate
Washington, D.C. 20510

Dear Senator Cohen:

The New England Division has completed its study of the proposed navigation improvements to the Fore River Channel at Portland and South Portland, Maine. Study of improvements to the Fore River was directed by Congressional resolutions. A draft copy of the Feasibility Report is furnished for review and comment.

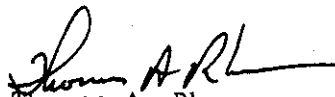
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Therefore, it is recommended that no Federal navigation improvements by the U.S. Army Corps of Engineers be undertaken at this time. It should be noted, however, that upon reconstruction of the Portland Bridge, the Corps of Engineers can modify the channel to accommodate the increased navigation opening. This can be accomplished through the Corps' operation and maintenance program.

I would like to add at this time, that to finalize the report in an expeditious manner, comments should reach me no later than January 31, 1987. Any comments will be included in our final report to the Board of Engineers for Rivers and Harbors.

If there are any questions, I may be contacted at (617) 647-8220. The Project Manager, Mr. Raymond Korber, is coordinating the investigation. Should your staff desire further information, he can be reached at (617) 647-8553.

Sincerely,



Thomas A. Rhen
Colonel, Corps of Engineers
Division Engineer

Attachment

Copy furnished:
Honorable William S. Cohen
United States Senate
Box 1938
Portland, Maine 04101

U.S. Senators

Honorable William S. Cohen
United States Senate
Washington, D.C. 20510

Honorable William S. Cohen
United States Senate
Box 1938
Portland, Maine 04101

Honorable George Mitchell
United States Senate
Washington, D.C. 20510

Honorable George Mitchell
United States Senator
151 Forest Avenue
P.O. Box 8300
Portland, Maine 04101

U.S. Representatives

Honorable John R. McKernan, Jr.
House of Representatives
Washington, D.C. 20515

Honorable John R. McKernan, Jr.
Representative in Congress
Box 10240
Portland, Maine 04104

State Senators

Honorable Mary Najarian
Maine Senate
Portland, Maine 04103

Honorable Thomas H. Andrews
Maine Senate
Portland, Maine 04101

Honorable Barbara A. Gill
Maine Senate
S. Portland, Maine 04106

State Representatives

Honorable Earl G. Nicholson
Maine House of Representatives
S. Portland, Maine 04106

Honorable Edward J. Kane
Maine House of Representatives
S. Portland, Maine 04106

Honorable Harold M. Macomber
Maine House of Representatives
S. Portland, Maine 04106

Honorable Edith S. Beaulieu
Maine House of Representatives
Portland, Maine 04101

Honorable Laurence E. Connolly, Jr.
Maine House of Representatives
Portland, Maine 04101

Honorable Harlan Baker
Maine House of Representatives
Portland, Maine 04101

Honorable Merle Nelson
Maine House of Representatives
Portland, Maine 04101

Honorable Peter J. Manning
Maine House of Representatives
Portland, Maine 04101

Honorable Joseph C. Brannigan
Maine House of Representatives
Portland, Maine 04101

Honorable Craig Higgins
Maine House of Representatives
Portland, Maine 04101

Honorable Annette M. Hoglund
Maine House of Representatives
Portland, Maine 04101